

c. Amendments to the Claims

1. (Currently amended) A method for transmitting digital data, comprising:
splitting a coherent optical carrier having a an optical subcarrier into mutually coherent optical carriers;
producing sequences of phase shifts in each of the mutually coherent optical carriers; and
interfering the mutually coherent optical carriers to produce an output optical carrier whose optical subcarrier has modulated inphase and quadrature phase components with a sequence of pairs of values; and
wherein the pairs of values of the modulated inphase and quadrature phase components produced by the interfering correspond to coordinate pairs for signal points of one of the 4-PSK 2D constellation, the 16-QAM 2D constellation, and the 16-PSK 2D constellation.

2. (Original) The method of claim 1, wherein the pairs of values produced by the interfering correspond to the signal points to about 5% or better.

3. (Original) The method of claim 1, wherein the signal points represent the 4-PSK 2D constellation.

4. (Original) The method of claim 1 wherein the signal points represent one of the 16-QAM constellation and the 16-PSK constellation.

5. (Original) The method of claim 1, wherein the splitting forms four mutually coherent optical carriers and the producing makes sequences of phase shifts on the four mutually coherent optical carriers.

6. (Currently amended) The method of claim 1, further comprising producing a time delay of the optical subcarrier of each mutually coherent optical carrier between performing the steps of splitting and interfering, magnitudes of differences between the

time delays for different ones of the mutually coherent optical carriers differing from an integer number of periods of the optical subcarrier ~~periods~~ by at least 0.1 times the optical subcarrier's period.

7. (Original) The method of claim 1, wherein the producing further comprises:
passing each mutually coherent optical carrier through a separate electro-optical phase shifter while supplying a sequence of control voltages to the electro-optical phase shifters to produce the sequence of modulations thereon.

8. (Currently amended) The method of claim 1 further comprising:
splitting the coherent optical carrier into four mutually coherent second optical carriers;
producing second sequences of second phase shifts on each of the mutually coherent second optical carriers; and
then, interfering the mutually coherent second optical carriers to produce a an optical subcarrier having a second sequence of pairs of modulated inphase and quadrature phase components; and
wherein the pairs of values of the modulated inphase and quadrature phase components of the second sequence correspond to coordinate pairs for signal points of one of the 4-PSK 2D constellation, the offset 4-PSK 2D constellation, and the trapezoid 2D constellation.

9. (Previously Presented) The method of claim 8, wherein the pairs of values of the first sequence correspond to coordinate pairs for signal points of the 16-QAM 2D constellation and the pairs of values of the second sequence correspond to coordinate pairs for signal points of the 4-PSK 2D constellation or the offset 4-PSK 2D constellation.

10. (Previously Presented) The method of claim 8, wherein the pairs of values of the first sequence correspond to coordinate pairs for signal points of the 16-PSK 2D

constellation and the pairs of values of the second sequence correspond to coordinate pairs for signal points of the 4-PSK 2D constellation or the trapezoid 2D constellation.

11. (Currently amended) A system, comprising:

a light source to produce a coherent optical carrier with an optical subcarrier;

an electro-optical modulator comprising an optical splitter to split the capable of receiving an optical carrier with a subcarrier into mutually coherent optical carriers, a plurality of controllable phase shifters to process corresponding ones of the mutually coherent optical carriers, and an optical combiner to receive the processed mutually coherent optical carriers from the phase shifters, the electro-optical modulator and light source being configured such that the mutually coherent optical carriers processed by the phase shifters interfere in the optical combiner; and

a controller configured to apply a stream of sets of control voltages to the electro-optical modulator responsive to receiving a stream of digital data, the modulator being configured to output an optical carrier with a modulated subcarrier in response to each applied set of control voltages; and wherein such that the modulator is configured to respond to the stream of sets of control voltages from the controller by modulating the subcarrier to produce produces a stream of modulated pairs of values onfor inphase and quadrature phase components of the optical subcarrier thereof, the pairs of values correspondingcorrespond to coordinate pairs of signal points of one of the 4-PSK 2D constellation, the 16-QAM 2D constellation, and the 16-PSK 2D constellation.

12. (Currently amended) The system of claim 11, wherein the modulator is configured to respond to the stream of sets of control voltages from the controller by modulating the subcarrier to produce a stream of modulated pairs of values for inphase and quadrature phase components thereof, the pairs of values correspond corresponding to coordinate pairs of signal points of the 4-PSK 2D constellation to 5% or better.

13. (Currently amended) The system of claim 11, wherein the modulator is configured to respond to the stream of sets of control voltages from the controller by modulating the subcarrier to produce a stream of modulated pairs of values for inphase

~~and quadrature phase components thereof~~, the pairs of values correspond ~~corresponding~~ to coordinate pairs of signal points of one of the 16-QAM constellation and the 16-PSK constellation to 5% or better.

14. (Currently amended) The system of claim 11, wherein the ~~modulator further comprises~~: an optical splitter has with four outputs, ~~the optical splitter for receiving the optical carrier~~; and ~~the~~ an optical combiner has with four inputs; ~~[[,]]~~ and wherein the modulator comprises four optical waveguides, each waveguide connecting one of the outputs of the splitter to one of the inputs of the combiner such that each input is connected to one output, ~~the waveguides~~ each waveguide including one of the controllable phase shifters~~electro-optical modulators~~, the controllable phase shifters being connected to receive the sets of control voltages applied by the controller.

15. (Currently amended) The system of claim 14, wherein the waveguides have different lengths and wherein magnitudes of differences between the lengths of any two of the waveguides differ from an integer number of ~~subcarrier~~ wavelengths of the optical subcarrier by at least 0.1 times the optical subcarrier's wavelength.

16. (Currently amended) The system of claim 11, wherein the electro-optical modulator comprises a pair of cascaded first and second electro-optical modulators; and wherein the first modulator is configured to respond to sets of the control voltages by modulating the optical subcarrier to produce a stream of modulated pairs of second values on ~~for~~ inphase and quadrature phase components thereof, the pairs of second values corresponding to coordinate pairs of signal points of one of the 4-PSK 2D constellation, the trapezoid 2D constellation, and the offset 4-PSK 2D constellation.

17. (Currently amended) The system of claim 11, wherein the controller is configured ~~to receive digital data and~~ to cause the modulation of inphase and quadrature phase components of the optical subcarrier with two or more bits of digital data per symbol interval.

18. (Currently amended) A system, comprising:

a light source to produce a coherent optical carrier with an optical subcarrier;

an electro-optical modulator comprising an optical splitter that is configured to receive an ~~the~~ optical carrier wave and that has ~~having~~ four outputs, an optical combiner with four inputs, and four waveguides connecting the outputs to the inputs such that each input is connected to one of the outputs, each waveguide having an electro-optical phase shifter responsive to applied voltages, the electro-optical modulator and light source being configured such that optical carriers output by the waveguides interfere in the optical combiner in response to the source producing the coherent optical carrier; and

a controller being configured to apply a stream ~~one of a plurality~~ of sets of control voltages to the electro-optical phase shifters in response to receiving a stream set of digital data, the combiner is configured to output the optical carrier with a modulated subcarrier in response to each applied one of the sets of control voltages; and such that wherein the modulator produces a stream of modulated pairs of values on responds to the sets of control voltages by modulating values of the inphase and quadrature phase components of the optical subcarrier, such that the modulated pairs of values corresponding ~~correspond~~ to coordinate pairs of signal points of a 2D signal constellation whose signal points have equal lengths.

19. (Currently amended) The system of claim 18, wherein the waveguides have different lengths and wherein magnitudes of differences between the lengths of any two of the waveguides differ from an integer number of ~~subcarrier~~ wavelengths of the optical subcarrier by at least 0.1 times the optical subcarrier's wavelength.

20. (Original) The system of claim 19, wherein the signal points form a representation of one of the 4-PSK 2D constellation, the trapezoid 2D constellation, and the offset 4-PSK 2D constellation.